Small Business Innovation Research/Small Business Tech Transfer

Common and Configurable Flash LIDAR Sensor for Space-Based Autonomous Landing, Rendezvous, and Docking Missions, Phase I

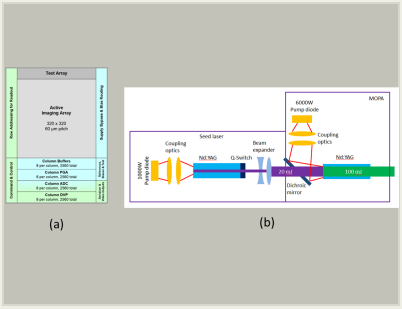
Completed Technology Project (2018 - 2019)

Project Introduction

NASA has identified Flash LIDAR as the key mapping, pose, and range sensor technology of choice for autonomous entry, decent, and precision landing (EDL) on solar system bodies and autonomous rendezvous and docking operations (RDO) for asteroid sample and return, space craft docking, and space situational awareness missions. Flash LIDAR sensors exploit the time of flight principle to produce real time scene range and intensity maps at video rates. Existing 3D Flash LIDAR sensors are custom-built for the specific mission. However, NASA has concluded that the majority of the Flash LIDAR emerging performance and size, weight, and power (SWAP) requirements for both of these mission sets are similar. This revelation provides the motivation to develop a common configurable Flash LIDAR sensor that can be tuned to the specific objectives and accommodation constraints for each mission. State of the art 3D Flash LIDAR Focal Plane Array (FPA) and laser advancements are needed to advance the common sensor architecture initiative. The goal of the proposed Phase I program is to identify feasible FPA and laser state of the art design and performance advancements which enable a subsequent Phase II common Flash LIDAR sensor demonstration

Anticipated Benefits

- Entry, Decent, and Landing, Rover Mobility and Navigation, Topographical Mapping, Mars and other Planetary Exploration, Exploration of Moons (ALHAT, Jupiter Icy Moons), Asteroid and Comet Rendezvous and Sample Return, ISS Rendezvous and Docking, Rock Abundance and Distribution Maps
- Robotic Ground Vehicles Collision Avoidance and Mobility Operations for DOD and commercial mining, Autonomous Navigation for UGVs and unmanned surface vehicles (USVs), Air to Air Vehicle Refueling for the Air Force Test Pilot School (system will be mounted on an F16), Helicopter landing in Brown-Out conditions, Long Range Surveillance and Remote Sensing for DOD; terrain mapping Underwater Imaging Cameras for the Office of Naval Research



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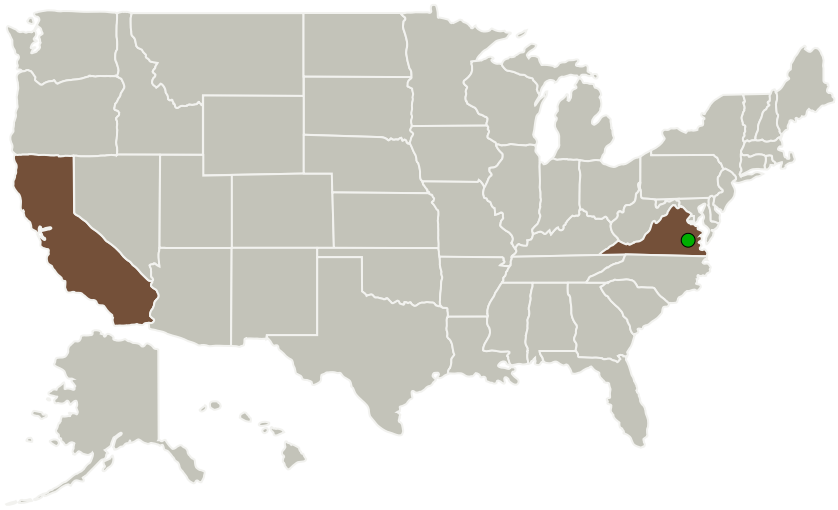
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Advanced Scientific Concepts, Inc.	Lead Organization	Industry	Goleta, California
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
California	Virginia

Project Transitions

July 2018: Project Start

February 2019: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/140971)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Advanced Scientific Concepts, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

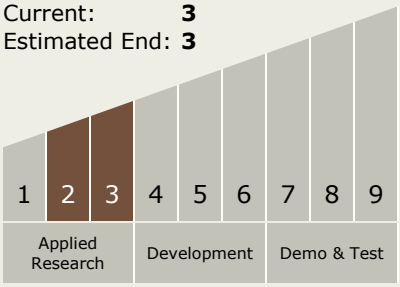
Carlos Torrez

Principal Investigator:

William Johnson

Technology Maturity (TRL)

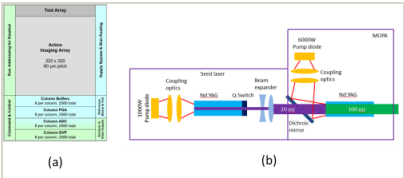
Start: **2**
Current: **3**
Estimated End: **3**



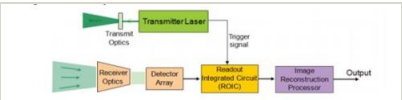
Common and Configurable Flash LIDAR Sensor for Space-Based Autonomous Landing, Rendezvous, and Docking Missions, Phase I

Completed Technology Project (2018 - 2019)

Images



Briefing Chart Image
Common and Configurable Flash LIDAR Sensor for Space-Based Autonomous Landing, Rendezvous, and Docking Missions, Phase I *(https://techport.nasa.gov/image/132725)*



Final Summary Chart Image
Common and Configurable Flash LIDAR Sensor for Space-Based Autonomous Landing, Rendezvous, and Docking Missions, Phase I *(https://techport.nasa.gov/image/128066)*

Technology Areas

Primary:

- TX09 Entry, Descent, and Landing
  - TX09.4 Vehicle Systems
    - TX09.4.4 Atmosphere and Surface Characterization

Target Destination

Others Inside the Solar System